The Eurasia Proceedings of Science, Technology, Engineering & Mathematics (EPSTEM)
ISSN: 2602-3199

The Eurasia Proceedings of Science, Technology, Engineering and Mathematics (EPSTEM), 2025

Volume 38, Pages 1-11

IConTES 2025: International Conference on Technology, Engineering and Science

# Recycling of Ceramic Tile Waste in the Formulation of Self-Compacting Concrete

**Rabehi Bahia**
University of Boumerdes

**Ghernouti Youcef**
University of Boumerdes

**Mansour Sabria Malika**
University of Boumerdes

**Boumchedda Khaled**
University of Boumerdes

**Abstract**: Aggregates represent 75% of concrete volume; however, the exhaustion of natural aggregate deposits and the difficulties in opening new quarries require a new sources and studying the possibility of substituting natural aggregates with waste. This study investigates the potential use of recycled ceramic tile waste as a substitute for natural coarse aggregates in self-compacting concrete (SCC). Several SCC mixtures were formulated with varying replacement levels of natural aggregates by ceramic tiles waste aggregates CTW (25%, 50%, 75%, and 100%). The fresh properties were evaluated using slump flow, sieve stability, and L-box tests, while the hardened properties were assessed through Ultrasonic Pulse Velocity, compressive and flexural strength tests. The results demonstrate the technical feasibility of incorporating ceramic tile waste as recycled aggregates in SCC. Up to 75% substitution, the mixtures maintained satisfactory fresh and mechanical performance. This research provides valuable experimental data supporting the valorization of ceramic tile waste in sustainable concrete production, contributing to environmental conservation and resource.

**Keywords:** Self-compacting concrete, Recycled aggregates, Valorization, Environment, Ceramic tile waste

## Introduction

Construction and public works require about 560 million tons of aggregates and similar materials each year. Consequently, their extraction from rivers or from massive mountain rocks has a significant impact on the environment. The ecological push requires us to take the greatest possible care of the environment, either by avoiding the use of natural materials or by eliminating by-products and waste, the often-unsightly deposits of which can lead to pollution of the natural environment. The use of recycled aggregates in construction offers several advantages at the environmental, human, technological, and economic levels, which are of increasing interest to industrial companies.

In many countries, regulations and procedures on reusing waste materials in construction applications have been established, and many countries have begun transforming constructional wastes into RA (Ismail & Ramli, 2013; Park & Noguchi, 2013; European Parliament, 2008). Many authors from different countries study the use of recycled materials in civil engineering problem: (Levy & Helene, 2004; Poon et al, 2007) in their research papers marked an aggregate which is got from demolished masonry and concrete structures as potentially good for use in new concrete.


- Selection and peer-review under responsibility of the Organizing Committee of the Conference

Rabehi et al., (2024) study the development of eco-materials based on recycled material by recovery of dam sediment, and the incorporation of lightweight aggregates. The obtained results show that the blocks made from 50% lightweight aggregates and 10% stabilizers (cement) have the best performances.

There are quite also a number of applications of using recycled glass in the construction industry all over the world. The application includes using glass in asphalt concrete, normal concrete, back-filling, sub-base, tiles, masonry blocks, paving blocks another decorative purpose (Tabsh & Abdelfalah, 2009; Dhir et al., 2001; Sagoe-Crentsil et al., 2001; Meyer, 1999; Robert & Kirby, 2001).

Duan & Poon, (2014) presents the experimental results of a study on comparing the difference in properties of recycled aggregates (RAs) with varying amounts of old adhered mortar obtained from different sources and evaluating the influence of the different RAs on the mechanical and durability properties of recycled aggregate concrete (RAC). The results show that the performance of RAs from different sources varied greatly and RA of good quality can be used to produce high strength concrete with hardened properties comparable to those of the corresponding natural aggregate concrete (NAC).

Several research have studied the recovery of recycled materials in self-compacting concrete and in construction works, (Bignozzi & Sandrolini, 2006) study the mechanical and microstructural behavior of self-compacting concrete containing different amounts of untreated tire waste. A comparison of the obtained compressive strengths with literature data confirms that self-compacting technology helps binding rubber phases.

Dilbas et al., (2014) have realized an experimental studies for determining the mechanical and the physical properties of the recycled aggregate concrete (RAC) with and without silica fume (SF), inspired by the Urban Renewal Law which regulates circumstance of existing structures in Turkey. They conclude that the proportion of 30% RA in concrete mixtures is proposed as the optimum ratio and found that 5% SF content in the RAC is more convenient to improve the low properties of RAC (i.e. compressive strength).

This study explores the feasibility of using recycled aggregates derived from ceramic tile waste in self-compacting concrete. Several mix designs were evaluated, incorporating different replacement levels of natural aggregates with recycled aggregates at 25%, 50%, 75%, and 100%.

## Experimental program

### Materials

*Binder*

All self-compacting concrete mixtures investigated in this study were prepared with ordinary cement (OC) equivalent to CEM II/B- 42.5 from the M'silla cement plant Algeria, according with NA 442, EN 197-1 and NF P 15-301/94 standard. Its specific gravity is 3.1 g/cm$^3$ and its specific surface area Blaine SSB is 3168 cm$^2$/g. Limestone powder were used as addition materials in the mix proportions at the rate of 10%, its characterized by high chemical purity, their specific surface area is about 5350cm$^2$/g and its specific gravity is 2.66 g/cm3. The chemical composition of the cement and the fine materials are listed in Table 1.

Table 1. Chemical composition of cement and limestone powder

| Elements (%) | $SiO_2$ | $AL_2O_3$ | $Fe_2O_3$ | CaO | MgO | $K_2O$ | $Na_2O$ | $SO_3$ | Cl | LOI |
|---|---|---|---|---|---|---|---|---|---|---|
| Cement | 15.80 | 4.15 | 2.31 | 61.90 | 2.39 | 0.69 | 0.06 | 2.80 | 0.023 | 9.59 |
| Limestone | 0.04 | 0.03 | 0.02 | 56.03 | 0.17 | 0.02 | 0.05 | 0.08 | 0.03 | 43 |

*Aggregates*

The fine aggregates used in this study was a mixture of 41% natural dune sand (DS) and 59% crushed sand (CS) with a fineness modulus of 1.03 and 3.53, respectively. Two types of coarse aggregates were employed in the concrete mixtures: natural aggregates (NA) and recycled aggregates (RA) derived from ceramic tile waste. Two class of natural coarse aggregates were used: Crushed limestone gravel with particle size ranges of 3-8 mm and 8-15 mm, as shown in Figure 2. The recycled coarse aggregates used were produced by crushing ceramic tiles waste into two corresponding size fraction 3–8 mm and 8–15 mm (see Figure 2). The physical properties of all aggregates used in this study are summarized in Table 2, and their particle size distributions are illustrated in Figure 3.

a) NA 3-8 mm

b) NA 8-15mm

Figure 1. Natural coarse aggregates used (NA)

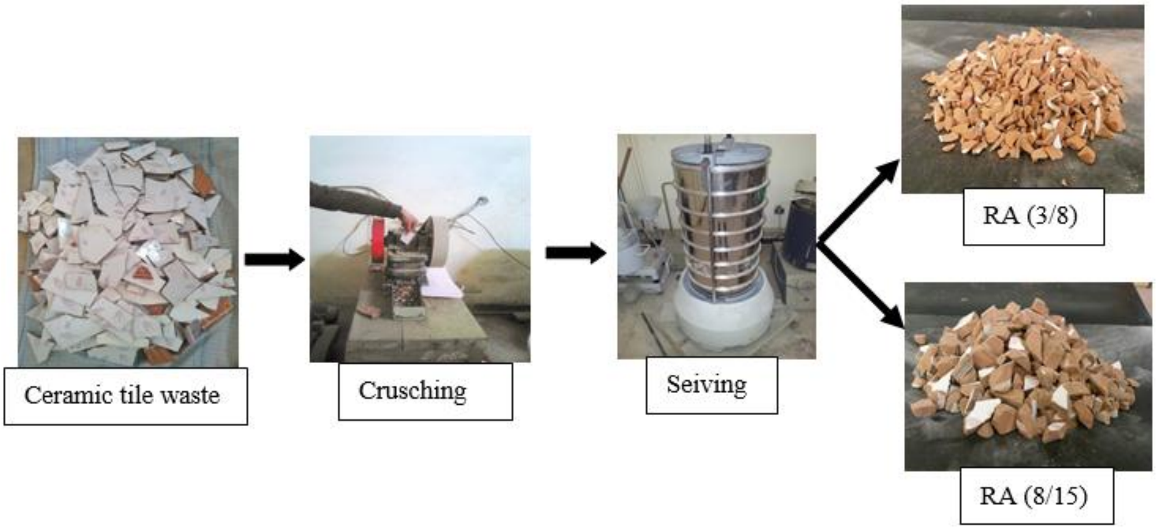



Figure 2. Preparation of recycled aggregates (RA) obtained from ceramic tiles waste

Table 3. Physical properties of coarse aggregates

| | Natural coarse aggregates (3/8 and 8/15) | Recycled ceramic tile coarse aggregates (3/8 and 8/15) |
|---|---|---|
| Apparent density, (g/cm$^3$) | 1.41 | 1.24 |
| Specific gravity, (g/cm$^3$) | 2.66 | 2.3 |
| Los Angeles (%) | 25.04 | 77 |
| Micro-Deval (%) | 26.64 | 3.4 |

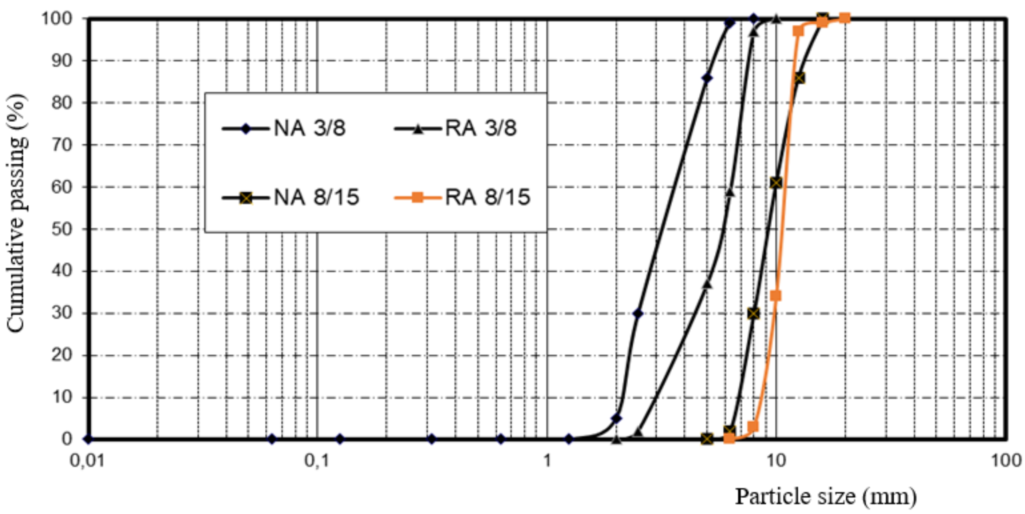



Figure 3. Particle size distribution of all coarse aggregates

*Superplasticizer*

To ensure the required workability of the self-compacting concrete (SCC) mixes, a high-range water-reducing superplasticizer (SP) was used: Sika ViscoCrete Tempo 12, in accordance with the NF EN 934-2 standard. This new-generation superplasticizer is based on acrylic copolymer technology. It has a solid content of 31% and a specific gravity of 1.06.

### Self-compacting Concrete Mixes

A total of five self-compacting concrete (SCC) mixes were prepared using the Japanese mix design method proposed by (Okamura and Ozawa, 1995). The mix proportions are detailed in Table 4. One reference mix incorporating only natural coarse aggregates (SCC) was produced, along with four additional mixes in which natural coarse aggregates (3/8 mm and 8/15 mm) were partially or fully replaced with recycled ceramic tile waste aggregates at replacement levels of 25%, 50%, 75%, and 100%. These mixes are referred to as CTW25, CTW50, CTW75, and CTW100, respectively. All SCC mixes were designed with a constant cement content of 430 kg/m³ and a water-to-binder ratio (w/b) of 0.38. The fine-to-coarse aggregate ratio was maintained at approximately 1.0.

Table 4. Mix proportions of self-compacting concrete in kg/m$^3$

| Mixtures | SCC | CTW25 | CTW50 | CTW75 | CTW100 |
|---|---|---|---|---|---|
| Cement | 430 | | | | |
| Water | 180 | | | | |
| Limestone | 43 | | | | |
| Dune sand (DS) | 284 | | | | |
| Crushed sand (CS) | 582 | | | | |
| NA 3/8 | 440 | 330 | 220 | 110 | 0 |
| NA 8/15 | 444 | 333 | 222 | 111 | 0 |
| RA 3/8 | 0 | 91 | 182 | 273 | 364 |
| RA 3/8 | 0 | 91 | 182 | 273 | 364 |
| SP | 7 | | | | |

### Casting and Curing of Test Specimens

The same mixing procedure was used for all concrete mixtures. Fresh concrete tests were carried out to evaluate slump flow diameter, segregation resistance, and the L-box ratio. For each mixture, three prism specimens (7×7×28) cm and three cylindrical specimens (11×22) cm were cast. All specimens were demolded after 24 hours and then stored in a curing room maintained at 90% relative humidity and a temperature of 20 ± 2 °C until the day of testing, in order to determine ultrasonic pulse velocity, as well as the flexural and compressive strengths.

Figure 4. Casting and curing test specimens

## Test Results and Discussion

### Fresh Concrete Properties

A series of tests were performed on fresh concrete to evaluate the influence of ceramic tile waste aggregates on the workability of self-compacting concrete (SCC). Flowability was assessed using the slump flow test, passing ability was evaluated using the L-box test, and segregation resistance was measured through the sieve stability test, in accordance with the specifications and guidelines for SCC established by the European Federation of National Associations Representing Concrete (EFNARC, 2005).

The slump flow test was used to evaluate the free deformability and flowability of SCC without any external obstructions. In this test, concrete was poured into a standard slump cone without compaction, and the slump flow value was determined as the average diameter of the spread, measured in two perpendicular directions after lifting the cone. (Figure 5 (a)).

The L-box test was conducted to measure the passing ability of SCC, specifically its capacity to flow through confined spaces and around reinforcement without segregation or blockage. Fresh concrete was placed in the vertical section of an L-shaped apparatus and allowed to flow into the horizontal section by opening a sliding gate. The result is expressed as the $H_2/H_1$ ratio, where $H_1$ is the height of concrete behind the gate and $H_2$ is the height at the end of the horizontal section (Figure 5 (b)).

Fanaly, the sieve stability test was carried out to evaluate the segregation resistance of SCC. In this test, a fresh concrete sample was placed on a 5 mm sieve and left to rest for a fixed period. The amount of water or fine material that passed through the sieve was measured, providing an indication of the mix's stability and resistance to bleeding or segregation (figure 5 (c)).

The results of slump flow diameter, L-box ratio, and sieve stability for the different concrete mixtures are summarized in Table 5. According to the guidelines established by (EFNARC 2005), SCC must meet specific performance criteria in the fresh state to ensure proper placement and long-term durability. The recommended slump flow diameter generally ranges from 600 mm to 800 mm, depending on the application and flow class. This ensures sufficient flowability without risk of segregation. The L-box passing ability ratio ($H_2/H_1$) should range from 0.8 to 1.0, indicating that the mix can pass through reinforcement without blockage. For segregation resistance, the sieve stability index should be less than or equal to 15%, ensuring the concrete remains homogeneous. Adhering to these criteria ensures a balanced SCC mix with proper deformability, passing ability, and stability.

a) Slump flow test b) L-Box test c) sieve stability test

Figure 5. Tests on fresh concretes

Table 5 presents the results of fresh state tests performed on the SCC mixtures incorporating varying proportions of recycled ceramic tile aggregates (RA). The obtained results indicate that increasing the RA content leads to a reduction in the slump flow diameter. This behavior can be attributed to the higher porosity of the recycled ceramic aggregates compared to natural ones, which causes greater water absorption during mixing. This results in a reduction of the free water available in the paste, thereby increasing the mixture's viscosity and reducing its flowability.

Table 5. Fresh properties of all mixtures

| Mix ID | Slump flow (cm) | L-box ratio (%) | Sieve stability (%) |
|---|---|---|---|
| CC | 74 | 0.95 | 7.26 |
| CTW25 | 70 | 0.89 | 6.37 |
| CTW50 | 65 | 0.86 | 6.04 |
| CTW75 | 62 | 0.83 | 5.57 |
| CTW100 | 38 | / | / |

The decrease in slump flow remains moderate for mixtures containing up to 75% RA, with reductions of approximately 5% (CTW25), 12% (CTW50), and 16% (CTW75) compared to the control mix (CC). All these mixtures maintain slump flow diameters greater than 60 cm, meeting the EFNARC minimum requirement for SCC, which demonstrates that acceptable flowability was retained despite the use of recycled aggregates. This can be partly attributed to the smooth glazed surface of the ceramic tile aggregates, which may enhance internal lubrication and improve the flow behavior of the mix. However, the mixture with 100% RA (CTW100) exhibited a significant drop in workability, with a slump flow diameter of only 38 cm, well below the minimum requirement of 55 cm (550 mm) for SCC. Consequently, this mix does not qualify as self-compacting concrete and was excluded from the remainder of the study.

The L-box test results further support the observations from the slump flow test. The passing ability decreased slightly with increasing RA content, dropping from 0.95 (CC) to 0.83 (CTW75). Despite this decline, all mixtures up to TW75 remain within the recommended EFNARC range (0.8–1.0), indicating sufficient ability to pass through confined spaces and around reinforcement without blocking. No L-box value was recorded for TW100 due to its insufficient flow.

Regarding segregation resistance, the results of the sieve stability test show that all mixtures demonstrate satisfactory stability, with segregation indices ranging from 5.57% to 7.26%, well below the EFNARC limit of 15%. The low segregation values suggest that the mixes maintained good cohesion, even with increasing amounts of recycled aggregate. This indicates that the replacement of natural aggregates with ceramic tile waste did not adversely affect the stability of the fresh SCC.

In summary, SCC mixtures containing up to 75% recycled ceramic aggregates exhibit acceptable fresh properties, meeting all EFNARC criteria for self-compacting concrete in terms of flowability, passing ability, and segregation resistance. The use of 100% recycled aggregate, however, significantly compromises workability and does not meet SCC standards.

**Hardened Concrete Properties**

To evaluate the mechanical performance of the hardened concrete, three key tests were conducted: the ultrasonic pulse velocity (UPV) test, the compressive strength test, and the flexural strength test. The UPV test is a non-destructive method used to assess the quality and uniformity of concrete by measuring the time it takes for an ultrasonic pulse to travel through a specimen between a transmitter and a receiver (Figure 6(a)). The velocity of the pulse is affected by the concrete's density and internal structure; higher velocities generally indicate a denser, more homogeneous material, while lower velocities suggest the presence of internal defects, cracks, or increased porosity.

The compressive strength test was performed in accordance with the NF EN 12390-3 standard to determine the axial compressive strength of cylindrical concrete specimens (11× 22) cm. before testing, both ends of each specimen were surface-ground to ensure smooth and parallel bearing surfaces, promoting uniform load distribution during loading (Figure 6(b)).

For the flexural strength test, prismatic specimens (7×7×28) cm were tested using a three-point bending configuration, following the NF EN 12390-5 procedure. Each prism was placed in a flexural testing machine and subjected to an increasing load, until failure occurred (Figure 6(c)).


a) Ultrasonic Pulse Velocity Test    b) Compressive strength test    c) Flexural strength test

Figure 6. Tests on hardened concretes

*Ultrasonic Pulse Velocity Test*

Figure 7 presents the results of the ultrasonic pulse velocity (UPV) test for the different self-compacting concrete (SCC) mixtures containing various proportions of recycled ceramic tile aggregates (RA) in comparison with control self-compacting concrete. The control mixture (SCC), made entirely with natural aggregates, achieved the highest pulse velocity at approximately 4820 m/s, reflecting excellent internal structure and low porosity. As the replacement rate of natural aggregates (NA) with ceramic tile waste aggregates (RA) increased, a gradual decrease in ultrasonic pulse velocity was observed. The mixture with 25% replacement (CTW25) showed a slight reduction, with a velocity of approximately 4700 m/s. This trend continued with CTW50, which recorded a further decrease to about 4620 m/s. The lowest velocity was observed in CTW75, with a value around 4300 m/s. This decreasing trend can be attributed to the higher porosity and angularity of the recycled ceramic tile aggregates, which lead to a less compact and more heterogeneous internal matrix. These factors reduce the ability of the concrete to transmit ultrasonic waves efficiently.

Despite this reduction, all mixtures maintained a UPV above 4000 m/s, and the first three (SCC, CTW25, CTW50) remained above the 4500 m/s threshold. According to ASTM C597, concrete with ultrasonic pulse velocities:

- Above 4500 m/s is generally classified as "good quality",
- Between 4000–4500 m/s as "medium quality",
- Below 3500 m/s may indicate low quality or internal defects.

Therefore, all tested mixtures can be considered acceptable to good quality, even when incorporating up to 75% recycled aggregates. This suggests that ceramic tile waste can be used effectively in SCC without significantly compromising the internal integrity of the concrete.

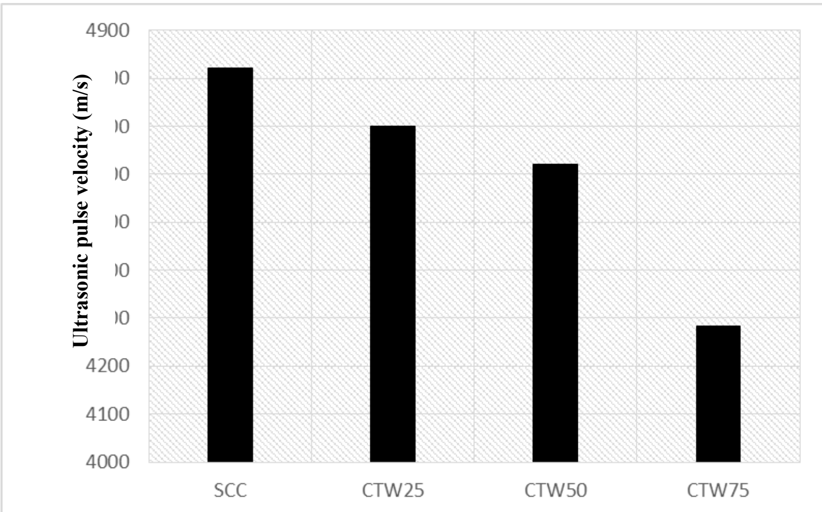



Figure 7. Ultrasonic pulse velocity of all mixtures

*Mechanical Strengths*

All mechanical test results for compressive and flexural strength at 28 days are presented in Figures 8 and 9, respectively. Additionally, table 6 summarizes the relative reductions in both compressive and flexural strength of self-compacting concrete (SCC) mixtures incorporating recycled ceramic tile aggregates, compared to the control mix made with natural aggregates. This comparison clearly demonstrates the impact of ceramic tile aggregate substitution on the mechanical performance of the concrete.

According to the mechanical test results, the compressive strength at 28 days (Figure 8) decreases progressively with the increasing substitution of natural aggregates by recycled ceramic tile waste. The reduction is approximately proportional to the replacement rate, reaching up to 30% for the concrete containing 75% recycled aggregates (CTW75). A similar trend is observed for the flexural strength (Figure 9). As the percentage of recycled aggregates increases, the flexural strength decreases, with a maximum loss of 17% at the 75% substitution level.

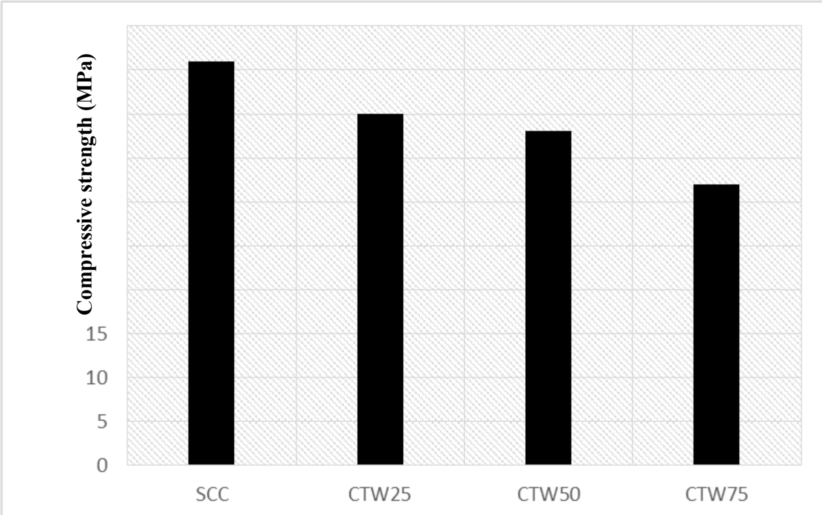



Figure 8. Compressive strength of all mixtures

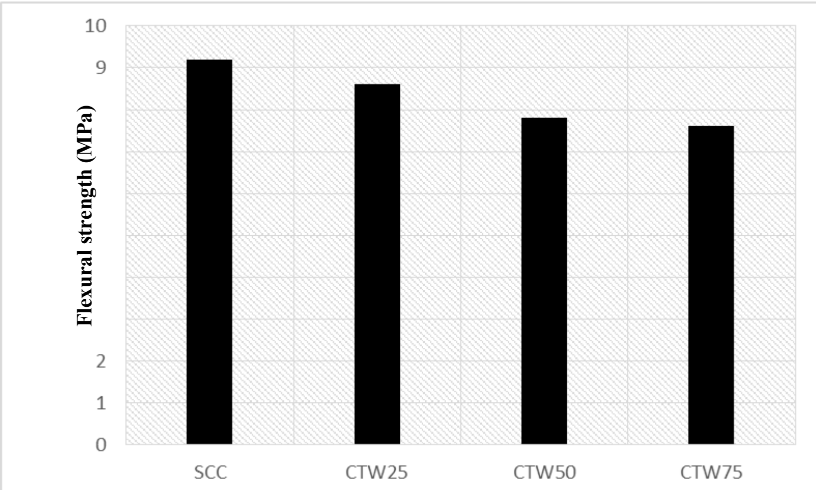



Figure 9. Flexural strength of all mixtures

Table 6. Loss of compressive and flexural strength

| Mix ID | Loss on compressive strength (%) | Loss on flexural strength (%) |
|---|---|---|
| CC | / | / |
| CTW25 | 13 | 6 |
| CTW50 | 17 | 15 |
| CTW75 | 30 | 17 |

These reductions in mechanical performance can be explained by several factors:

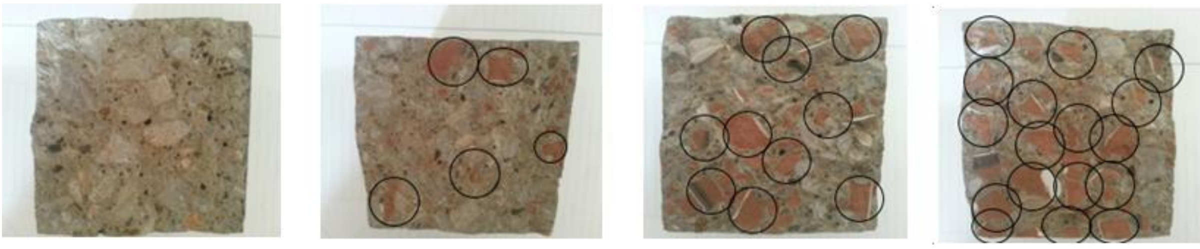
- The lower hardness and mechanical strength of recycled ceramic aggregates compared to natural silico-calcareous aggregates.
- The angular and irregular geometry of the ceramic waste aggregates, as shown in Figure 10, contributes to increased porosity in the concrete matrix and reduces its overall compactness.
- The presence of a smooth, vitrified surface on the ceramic aggregates clearly visible in Figure 13, which shows fragments of recycled ceramic tile waste. This glazed layer limits surface roughness and hinders effective bonding with the cement paste, thereby weakening the interfacial transition zone (ITZ).

Despite these reductions, the mechanical performance of the concrete remains within acceptable limits for structural applications, especially at substitution levels up to 50%, where strength losses remain relatively moderate.


Figure 10. Angular shape of waste ceramic tile

*Visual Observation of Aggregate Distribution in SCC*

The four images in Figure 11, show cross-sections of self-compacting concrete (SCC) specimens incorporating recycled ceramic tile waste as a partial replacement for natural aggregates at different levels: 0% (SCC), 25% (CTW25), 50% (CTW50), and 75% (CTW75). The black circles highlight visible recycled ceramic particles.



**SCC** **CTW25** **CTW50** **CTW75**

Figure 11. Distribution of recycled ceramic tile aggregates in SCC mixtures

The control mixture, containing only natural silico-calcareous aggregates, shows a dense and homogeneous distribution of aggregates. The surface appears compact with minimal voids or visible defects, indicating strong cohesion between aggregates and cement paste.

At 25% replacement, a limited number of red ceramic fragments can be seen, moderately dispersed within the matrix. Although the overall texture remains relatively dense, the presence of angular ceramic particles begins to introduce minor heterogeneity in the mix. Some small interfacial gaps may be visible, potentially weakening the ITZ slightly.

With 50% replacement, the concentration of ceramic waste increases noticeably. The ceramic particles are more prominent and uniformly distributed, but their angular and irregular shape creates more interfacial discontinuities. The mixture appears more porous compared to the control, suggesting reduced compactness and possible localized weaknesses.

The specimen with 75% recycled ceramic aggregates shows a high concentration of large, angular ceramic fragments. These are tightly packed but often poorly bonded with the cement paste. The image reveals more visible gaps and heterogeneity, indicating a significant impact on the concrete's microstructure. This aligns with the observed reduction in mechanical properties at this replacement level.

In conclusion, as the substitution rate of natural aggregates with recycled ceramic tile waste increases, the visual texture of the concrete becomes more heterogeneous, with more pronounced interfacial gaps and irregular particle distribution. This progression supports the mechanical test results, where higher CTW content leads to reduced compressive and flexural strength due to weaker aggregate–paste bonding and increased porosity.

## Conclusion

This experimental study investigated the performance of self-compacting concrete (SCC) mixtures made with recycled ceramic tile aggregates, replacing natural coarse aggregates at varying levels (25%, 50%, 75%, and 100%). The objective was to assess the feasibility of incorporating this construction and demolition waste into SCC, both in terms of fresh workability and mechanical strength.

*Fresh properties:*

Fresh concrete tests including slump flow, L-box, and sieve stability were conducted in accordance with EFNARC (2005) guidelines. The results revealed the following trends:

- Flowability decreased with higher recycled aggregate content, due to the increased water absorption and angular shape of ceramic particles, which raised the mix viscosity.
- Nevertheless, all mixtures up to 75% replacement achieved slump flow diameters exceeding 600 mm, thereby meeting EFNARC standards.
- Passing ability (L-box ratio) declined slightly with increasing substitution, but remained within acceptable limits up to 75%.
- Segregation resistance improved marginally with higher replacement rates, likely due to the higher viscosity and internal friction provided by the ceramic aggregates.

The mix containing 100% recycled aggregates recorded a slump flow diameter below 550 mm, indicating insufficient flowability for SCC requirements. As a result, this mixture was excluded from further testing.

*Hardened properties*:

Compressive and flexural strength tests conducted at 28 days showed a clear downward trend:

- Compressive strength decreased progressively with higher replacement levels, reaching a maximum reduction of 30% at 75% ceramic aggregate content.
- Flexural strength followed a similar pattern, with up to 17% loss at the same substitution level.

Despite these drawbacks, SCC mixtures with up to 50% recycled aggregate demonstrated acceptable mechanical performance, with only moderate strength losses approximately 13–17% in compression and 6–15% in flexion.
In addition, ultrasonic pulse velocity (UPV) testing confirmed the internal quality of the concrete. All mixtures recorded UPV values above 4500 m/s, indicating good material homogeneity and a relatively dense microstructure, even with the presence of recycled aggregates.

In summary, the use of recycled ceramic tile aggregates in self-compacting concrete represents a technically feasible and environmentally sustainable alternative to natural aggregates. At replacement levels up to 75%, SCC mixtures maintain satisfactory fresh and hardened properties, aligning with standard performance criteria. This approach not only contributes to waste valorization and natural resource conservation, but also offers potential economic advantages, positioning it as a promising solution for sustainable construction practices.

## Scientific Ethics Declaration

* The authors declare that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the authors.

## Conflict of Interest

* The authors declare that they have no conflicts of interest

## Funding

* This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Technology, Engineering and Science ( www.icontes.net ) held in Antalya/Türkiye on November 12-15, 2025.

## References


Bignozzi, M. C., & Sandrolini, F. (2006). Tyre rubber waste recycling in self-compacting concrete. *Cement and Concrete Research, 36*, 735-739.

Dhir, R., Limbachiya, M., & Dyer, T. (2001). *Recycling and reuse of glass cullet*. Thomas Telford Publishing.

Dilbas, H., Şimşek, M., & Çakır, Ö. (2014). An investigation on mechanical and physical properties of recycled aggregate concrete (RAC) with and without silica fume. *Construction and Building Materials, 61*, 50-59.

Duan, Z. H., & Poon, C. S. (2014). Properties of recycled aggregate concrete made with recycled aggregates with different amounts of old adhered mortars. *Materials & Design, 58*, 19-29.

EFNARC. (2005). *Specification and guidelines for self-compacting concrete*. European Federation of National Associations Representing Concrete.

European Parliament. (2008). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives. *Official Journal of the European Union, L 312*, 3-30.

Ismail, S., & Ramli, M. (2013). Engineering properties of treated recycled concrete aggregate (RCA) for structural applications. *Construction and Building Materials, 44*, 464-476.

Levy, S. M., & Helene, P. (2004). Durability of recycled aggregates concrete: A safe way to sustainable development. *Cement and Concrete Research, 34*(11), 1975-1980.

Meyer, C. (1999). *Development of glass concrete products* (Final report). New York Empire State Development.

Okamura, H., & Ozawa, K. (1995). Mix design for self-compacting concrete. *Concrete Library of JSCE, 25*, 107-120.

Park, W., & Noguchi, T. (2013). Influence of metal impurity on recycled aggregate concrete and inspection method for aluminum impurity. *Construction and Building Materials, 40*, 1174-1183.

Poon, C. S., Kou, S. C., & Lam, L. (2007). Influence of recycled aggregate on slump and bleeding of fresh concrete. *Materials and Structures, 40*(9), 981-988.

Rahebi, B., Ghernouti, Y., Mansour, S. M., & Boumchedda, K. (2024). Development and characterization of stabilized earth blocks based on recycled sediment and lightweight aggregates. *The Eurasia Proceedings of Science, Technology, Engineering & Mathematics (EPSTEM), 32*, 30-40.

Robert, J., & Kirby. (2001). *Final report: An investigation of performance of paving units made from recycled glass*. National Center for Environmental Research.

Sagoe-Crentsil, K. K., Brown, T., & Taylor, A. H. (2001). *Guide specification: Recycled glass as sand replacement in premix concrete*. CSIRO.

Tabsh, S. W., & Abdelfalah, A. S. (2009). Influence of recycled concrete aggregate on strength properties of concrete. *Construction and Building Materials, 23*, 1163-1167.


## Author(s) Information


**Rabehi Bahia**
University of Boumerdes
Independence Avenue, 35000 Boumerdes – Algeria
Contact e-mail: *y.ghernouti@univ-boumerdes.dz*

**Ghernouti Youcef**
University of Boumerdes
Independence Avenue, 35000 Boumerdes – Algeria

**Mansour Sabria Malika**
University of Boumerdes
Independence Avenue, 35000 Boumerdes – Algeria

**Boumchedda Khaled**
University of Boumerdes
Independence Avenue, 35000 Boumerdes – Algeria



**To cite this article:**

Bahia, R., Youcef, G., Malika, M.S, & Khaled, B. (2025). Recycling of ceramic tile waste in the formulation of self-compacting concrete. *The Eurasia Proceedings of Science, Technology, Engineering and Mathematics (EPSTEM), 38,* 1-11.